

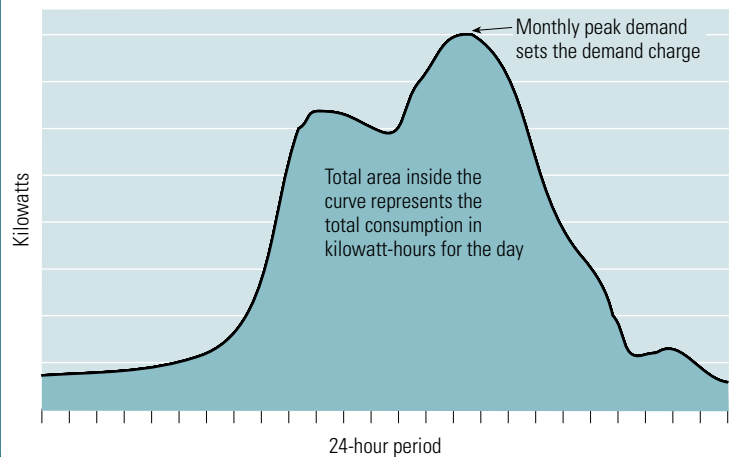
Managing Energy Costs in Restaurants

Restaurants in the United States spend on average \$2.90 per square foot (ft²) on electricity and \$0.85 per ft² on natural gas annually. This means 3 to 5 percent of their total operating costs are typically spent on energy. Some efficiency measures can be implemented with little or no investment. For those improvements requiring a larger initial outlay, many can pay for themselves quickly and, if planned well, can even enhance the ambience, appearance, and comfort of your establishment.

A number of opportunities for saving energy can often be found in the end-use areas that consume the most energy. In a typical restaurant, cooking, water heating, refrigeration, and lighting represent between 69 and 81 percent of total use depending on climate, making those systems the best targets for energy savings (see illustration, next page).

In order to better manage your building's energy costs, it helps to understand how you are charged for those costs. Most utilities charge commercial buildings for their natural gas based on the amount of energy delivered. Electricity, on the other hand, can be charged based on two measures—consumption and demand (**Figure 1**). The consumption component of the bill is based on the amount of electricity, in kilowatt-hours (kWh), that the building consumes during a month. The demand component is the peak demand, in kilowatts, occurring within the month or, for some utilities, during the previous 12 months. Demand charges can range from a few dollars per kilowatt-month to upwards of \$20 per kilowatt-month. Because it can be a considerable percentage of your bill, you should take care to reduce peak demand whenever possible. As you read the following energy cost-

Figure 1: Diagram of hypothetical daily load shape



management recommendations, keep in mind how each one will affect both your consumption and demand.

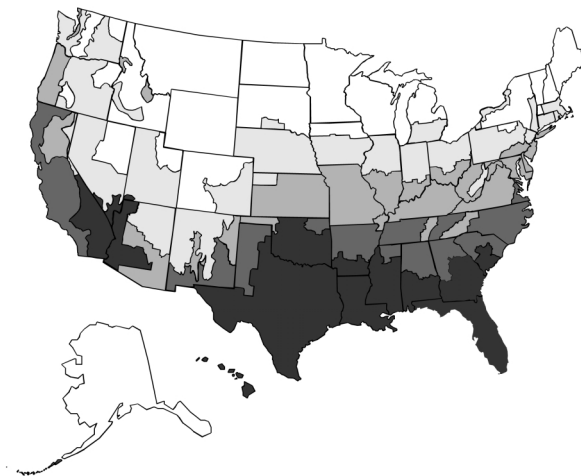
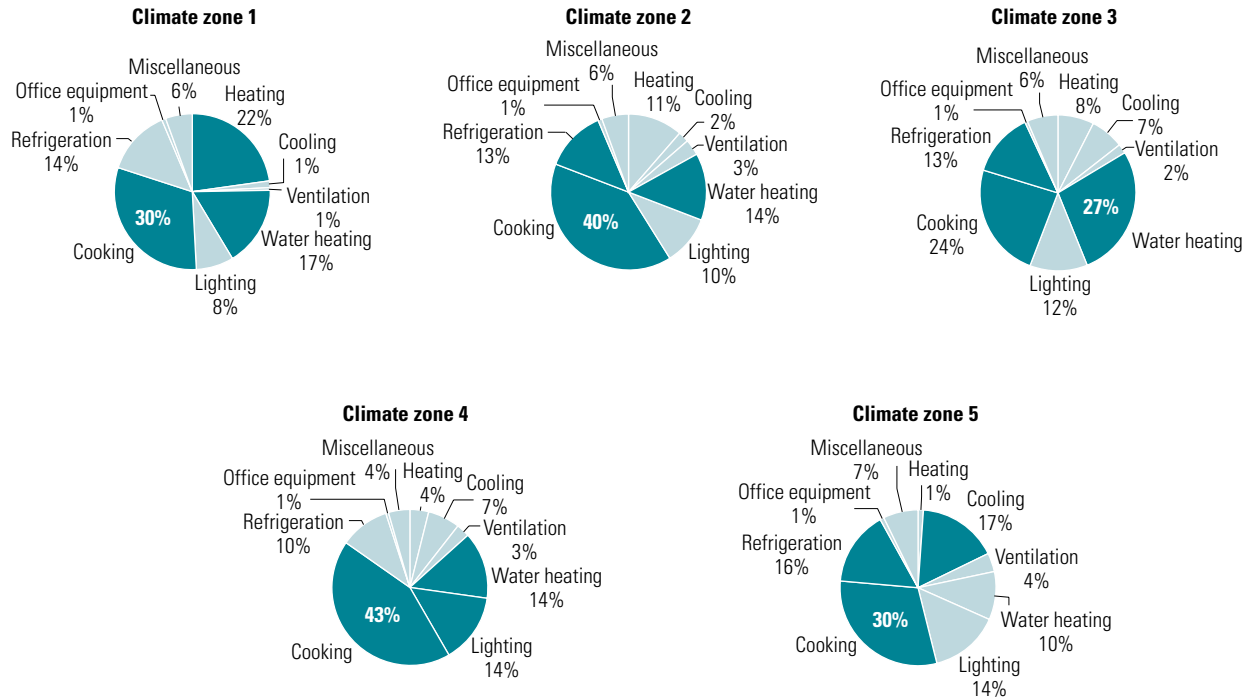
Quick Fixes

Restaurants tend to operate with narrow profit margins and have pretax income that is 4 to 7 percent of total revenue. So achieving just a 20 percent reduction in energy costs will translate directly into an additional 1 percent in profit. The following low- or no-cost steps can have a real impact on restaurants' bottom line.

Turning Things Off

Too often lights, ventilation fans, and other equipment are left on when not in use. Consider this fact: Every 1,000 kWh that you save by turning things off equals \$100 off your utility bill (assuming average electricity costs of 10 cents per kWh).

Energy consumption by end use in restaurants for five U.S. climate zones



Climate zones

- Zone 1 is less than 2,000 CDD and greater than 7,000 HDD.
- Zone 2 is less than 2,000 CDD and 5,500–7,000 HDD.
- Zone 3 is less than 2,000 CDD and 4,000–5,499 HDD.
- Zone 4 is less than 2,000 CDD and less than 4,000 HDD.
- Zone 5 is 2,000 CDD or more and less than 4,000 HDD.

Note: CDD = cooling degree days; HDD = heating degree days

Source: U.S. Energy Information Administration

An energy management system or a series of occupancy sensors—especially in walk-in coolers and other storage areas—can be installed to turn off or turn down equipment automatically. A less costly alternative is to simply inform your staff about being conscious of energy use.

Develop simple energy management procedures—with checklists—and assign responsibility between shifts and at the end of the day for turning off cooking equipment, exhaust fans, lights, computers, and other office equipment.

Turning Things Down

For equipment that you choose not to turn off entirely, such as air conditioning and heating systems, set controls to minimum levels during operating hours and turn down temperature settings on HVAC equipment and water heaters just before closing each night. (Programmable thermostats can do this job automatically.) In spaces where natural lighting is available, dim lights in proportion to the availability of sunlight. Keep your refrigeration units set at the appropriate temperature—but no cooler than necessary.

Repair and Maintenance

Keep lights clean. Clean lighting fixtures and bulbs to ensure they continue to perform as designed (especially if you use dimmers).

Inspect refrigerator and freezer doors. Poorly maintained refrigerator doors can leak cool air, which means the cooler runs unnecessarily to maintain the proper temperature. Replace worn gaskets and make sure doors are aligned properly. Also check that automatic door closers are functioning and strip curtains are not damaged.

Check the HVAC. Restaurant operators will get some of their biggest payoffs from maintenance and repairs of air-conditioning, space-heating, and ventilation systems. Some simple checks can indicate problems. But regularly scheduled preventive maintenance should help to avoid costly fixes while also keeping your energy bills down.

Check the economizer. Many air-conditioning systems use a dampered vent called an economizer to draw in cool outside air when it is available to reduce the need for mechanically cooled air. If not regularly checked, the linkage on the damper can seize up or break. An economizer stuck in the fully opened position can add as much as 50 percent to a building's annual energy bill by allowing hot air in during the air-conditioning season and cold air in during the heating season. Have a licensed technician check, clean, and lubricate your economizer's

linkage about once a year and make repairs if necessary.

Check air-conditioning temperatures. With a thermometer, check the temperature of the return air going to your air conditioner and then check the temperature of the air coming out of the register nearest the air-conditioning unit. If the temperature difference is less than 14° Fahrenheit (F) or more than 22°F, have a licensed technician inspect your air-conditioning unit.

Change filters. Filters should be changed monthly; they should be changed more often if you are located next to a highway or construction site where the air is much dirtier.

Check cabinet panels. On a quarterly basis, make sure the panels to your rooftop air-conditioning unit are fully attached with all screws in place, and check that gaskets are intact so no air leaks out of the cabinet. If chilled air leaks out, it can cost \$100 per rooftop unit per year in wasted energy.

Clean condenser coils. Check condenser coils quarterly for trash or natural debris that can collect there.

Check for airflow. Hold your hand up to air registers to ensure that there is adequate airflow. If there is little airflow, or if dirt and dust are coming out of the register, have a technician inspect your unit and ducts.

Longer-Term Solutions

Commissioning

Commissioning is a process in which engineers observe a building and perform a tune-up to ensure that its systems are operating appropriately and efficiently. Continuously monitoring a building's energy systems can lead to reductions of 10 to 15 percent in annual energy bills. For the typical 15,000-ft² restaurant, that could mean \$8,000 in savings per year! Commissioning also allows you to evaluate airflows between cooking and dining areas and to use that information for implementing air-pressure balancing measures. Commissioning usually costs between 5 and 40 cents/ft².

Kitchen Measures

Cooking equipment, coolers, and dishwashers are energy hogs in a restaurant. High-efficiency cooking equipment can be 15 to 30 percent more energy efficient than standard equipment. For example, induction cookware and lightwave ovens are highly efficient and appropriate for commercial applications.

Smart vent hoods. Intelligent, variable-speed hood controller systems can significantly reduce energy costs in commercial kitchens. In appropriate applications, this technology yields a one- to two-year simple payback. A photoelectric smoke or heat detector determines when and how much ventilation is needed and activates the exhaust fan at the proper speed.

Evaporator fan controllers in coolers. Nearly all walk-in coolers have forced-circulation evaporators that contain motorized propeller fans. These fans run continuously, despite the fact that full airflow is only necessary 50 percent of the time. Inexpensive controller devices are now available that slow these fans when full cooling capabilities are not necessary.

Lighting Measures

Switch to compact fluorescent lamps. Replacing incandescent bulbs with compact fluorescent lamps (CFLs) not only saves energy, but the bulbs also last much longer and save on maintenance. One restaurant owner replaced 20 100-watt bulbs with CFLs that used less energy, helping the restaurant to save more than \$400 per year. CFLs are now available in 2,700-kelvin models that produce a warm color tone similar to that of incandescent lamps. You can also adjust their light intensity by installing dimmable ballasts. Be sure to use CFLs in appropriate ballasts, especially if dimmers are in the circuit.

Install T8 lamps and electronic ballasts. If your facility uses T12 fluorescent lamps, relamping with the latest T8 lamps and electronic ballasts can cut 35 percent off

your lighting bill. Adding specular reflectors, new lenses, and occupancy sensors or timers can double the savings. Paybacks of one to three years are common.

Illuminate signs with LEDs. Replace incandescent exit signs, exterior signs, and menu boards with ones lit by light-emitting diodes (LEDs). Because LEDs direct light very effectively, they can draw less than 5 watts to illuminate a sign, whereas an incandescent bulb would use 40 watts to produce the same effect. Although initial costs for LEDs are high, you'll also save on maintenance costs—the lamps can last 5 to 10 years.

Use smart lighting design in parking lots. Many restaurants set their peak demand when they turn on lights in parking lots. And parking lots are often designed with far more lighting than most lighting experts recommend—in its *Lighting Handbook* (2000), the Illuminating Engineering Society of North America recommends an average of one foot-candle or less for most cases. Not only is overlighting costly, it can be dangerous to drivers if their eyes cannot adjust fast enough in the transition from highly lit to dark areas. For a new parking lot, consider low-wattage metal halide lamps in fixtures that direct the light downward, instead of high-pressure sodium lamps. Even though the wattage is lower, you could safely use fewer lamps if this type of lighting were adopted.

The Bottom Line

The conservation measures discussed here represent good investments, depending on your location, facility design, and energy costs. Not only will they help you to save money on your energy bills, but they can also enhance the aesthetics of your restaurant, giving a potential double boost to your bottom line.